Objectives and Standards for the New Brunswick Crown Forest for the 2007-2012 Period

New Brunswick
Department of Natural Resources
June, 2005

Table of Contents

INTRODUCTION....4

1.0 PUBLIC VALUE AND USES....4
Public Input....4

2.0 FOREST ECOSYSTEMS....5
2.1 Protected Natural Areas....5
2.2 Vegetation Communities....7
2.3 Fine Filter Strategy....12

3.0 Fish and Wildlife Habitat....12
3.1 Old-Forest Habitat....13
3.1.1 Habitat Objectives....13
3.1.2 Planning Requirements....15
3.1.3 Habitat Descriptions....16
3.1.4 Management Guidelines....16

3.2 Deer Winter Habitat....17
3.2.1 DWA Management Objectives....17
3.2.2 Planning Requirements....18
3.2.3 Deer Winter Habitat Descriptions....19
3.2.4 Management Guidelines....20

3.3 Watercourses and Wetlands....21

Table of Contents

4.0 TIMBER 23
4.1 Wood Supply 23
4.2 Scheduling 23
4.3 Tolerant Hardwood Management 23
4.4 Red Spruce, White Pine and Cedar Management 23
4.5 Red Pine Management 23
4.6 Harvest Prescriptions 23
4.7 Harvest Blocking 24
4.8 Silviculture 24

5.0 RECREATION & AESTHETICS 24
5.1 Aesthetic Buffers 24
5.2 Recreation 24

6.0 MANAGEMENT PLAN FORMAT 25

Appendix 1: TABLE OF CONTENTS FOR 2007 MANAGEMENT PLANS 26

Appendix 2: SAMPLE OSFH/OFH BLOCK SUMMARY 38

INTRODUCTION

This document builds on the strategy for management of the Crown forest in New Brunswick as defined in "The New Brunswick Public Forest: Our Shared Future" (June, 2005). This document details the specific objective levels, prescribed by the New Brunswick government, that Licensees must achieve in their 2007-2012 forest management plans.

1.0 PUBLIC VALUE AND USES

Public Input

In recent years, all Licensees formed Stakeholder Committees that are used to inform the public on how management plan objectives have been met. The 2004 Select Committee on Wood Supply has recommended that these Committees be enhanced as follows:

(i) The Department of Natural Resources (DNR) will co-chair these meetings along with the Licensees.

(ii) There will be a minimum of 2 meetings per year; more if preferred by the Committee membership.

(iii) All interested individuals and stakeholders will be invited to attend and their membership and participation will be actively solicited.

(iv) The Stakeholder Committee will focus on discussion about how management plan objectives have been implemented. Input on how annual operating plans will be derived from the approved management plan will be solicited.

(v) The Stakeholder Committee will strive to educate and provide information about Crown land forest management.

(vi) The Stakeholder Committee will keep detailed minutes and will record issues raised and document their resolution.

2.0 FOREST ECOSYSTEMS

New Brunswick Crown land forest management objectives for 2007-2012 include additional objectives to address the maintenance of the diversity of forest ecosystems and their associated ecological values. To achieve this, both coarse- and fine-filter objectives have been developed to address these values and are complementary parts of a comprehensive protected natural areas strategy. The coarse-filter approach ensures that the full range of naturally-occurring forest types and successional stages will be maintained on Crown land and is accomplished through Vegetation Community objectives and through a network of Protected Natural Areas. The fine-filter approach is supported through the protection of unique ecological sites using a Fine Filter Strategy.

2.1 Protected Natural Areas

New Brunswick has been protecting portions of Crown land for a number of years. In 1985, Oak Mountain, the Phillipstown Blue Heron Nesting Site and the Cranberry Lake Red Oak Stand were set aside as ecological reserves. In 1992 the Province signed the National Forest Strategy and promised to establish a broad network of Protected Natural Areas by 2000. This renewed commitment to protect the natural environment led to the creation of five more ecological reserves in 1994.

In 1995, a change in legislation placed Protected Natural Areas (PNA) under the Crown Lands and Forests Act; over the next five years, eight more ecological reserves were set aside along with five conservation areas (which permit access for recreation). Although small—most less than 100 ha in size—ecological reserves and conservation areas are dedicated to preserving specific ecosystem types (e.g., forests and bogs) and/or wildlife species. In 2001, ten large representative PNA were announced. All of these sites were placed under special legislation in 2003. This legislation is known as the Protected Natural Areas Act and Regulations. It reclassified existing ecological reserves and conservations areas as Class I PNA. The 10 large sites were classed as Class II Protected Natural Areas (Figure 1).

Each of these protected Natural Areas must be accommodated in the 2007-12 forest management plans by each of the corresponding Licensees.

Figure 1: New Brunswick's Protected Natural Areas

CLASS I

1 Bay du Vin Island
2 Blue Mountain
3 Cranberry Lake
4 Freeze Lakes
5 Glazier Lake
6 Gover Mountain
7 Hovey Hill
8 Little Salmon River
9 Little Tomooswa Lake
10 Loch Alva I
11 McCoy Brook
12 McManus Hill
13 Mount Elizabeth
14 Oak Mountain
15 Phillipstown
16 Point Wolfe River Gorge
17 St. Croix River Islands
18 South Kedgwick River
19 Tabusintac
20 Wilson Brook

CLASS II

21 Black River
22 Caledonia Gorge
23 Canaan Bog
24 Canoose Flowage
25 Grand Lake Meadows
26 Jacquet River Gorge
27 Kennedy Lakes
28 Loch Alva II
29 Mount Carleton Park Extension
30 Spednic Lake

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2.2 Vegetation Communities

Forest ecosystems are represented by aggregations of forest stands in the management planning process. The ecological descriptors of stands are vegetation community and successional stage. Vegetation communities are defined using overstory tree species composition (Table 1). Based on a biodiversity assessment of Crown lands, older successional stages are targeted for objectives, as these stages are most at risk of decreasing in area due to human activities.

Vegetation community objectives are expressed as area to be maintained in the mature/overmature successional stage for each community across Crown land. The only exception is the intolerant hardwood-softwood community (IHSW), which historically increases after human disturbance and is not at risk under present activities. Objectives are equivalent to 12% of the total area in each community as defined in the 1982 provincial inventory and adjusted for human disturbance. Objectives were determined for ecoregions and prorated to Crown Licenses (Table 2).

For the 2007 Forest Management Plan, objectives for finer-resolution vegetation communities have been added to ensure the representation of several vegetation communities that occur less frequently in New Brunswick. These communities have components of red spruce, eastern hemlock, eastern larch, and red pine. The finer-resolution vegetation community objective levels in Table 3 are 'nested' within the objectives in Table 2 (i.e., not additive). These finer-resolution vegetation community objective levels were based on the frequency (calculated from the most recent photo-interpreted forest inventory) that the tree species mentioned above occur within the vegetation communities established in the 2002 Forest Management Plan.

Table 1. Species Composition Criteria of Vegetation Communities

Vegetation Community	Compositional Criteria[1]	
Tolerant Hardwood Pure (THP)	SW[2] < 50%;	TH[3] ≥ 20%; TH+RM[4] ≥ 75%
Tolerant Hardwood - Softwood (THSW)	SW < 50%;	TH ≥ 20%; TH+RM ≥ 35% and < 75%
Intolerant Hardwood - Softwood (IHSW)	SW < 50%;	TH < 20% or TH+RM < 35
Pine (PI)	SW ≥ 50%;	PI[5] ≥ 35%
Jack Pine (JP)	SW ≥ 50%;	JP[6] ≥ 35%
Cedar (CE)	SW ≥ 50%;	EC[7] ≥ 35%
Black Spruce (BS)	SW ≥ 50%;	BS[8] ≥ 35%
Spruce (SP)[11]	SW ≥ 50%;	SP[9] ≥ 35%
Balsam Fir (BF)[12]	SW ≥ 50%;	BF[10] ≥ 35%
Tolerant Hardwood - Softwood (THSW)	SW ≥ 50%;	TH ≥ 20%; TH+RM ≥ 35% and < 75%

[1] Criteria are not mutually exclusive. Stands that meet more than one set of criteria are assigned based on the priority indicated by the order in the table.

[2] All softwood species; [3] Tolerant hardwood: primarily sugar maple, yellow birch and American beech; [4] Red maple; [5] Pine: white and red pine; [6] Jack pine; [7] Eastern cedar; [8] Black spruce;

[9] Spruce: white and red spruce; [10] Balsam fir;

[11] Includes those stands with greater than 75% spruce+fir and greater than 35% spruce (SPP);

[12] Includes those stands with greater than 75% spruce+fir and greater than 35% fir (BFP)

Table 2. Management objectives for vegetation communities by License and Ecoregion

Ecoregion	Vegetation Community	Objective by Crown License for Mature/Overmature Vegetation Community (ha)									
		1	2	3	4	5	6	7	8	9	10
1	THP	280	-	-	-	-	-	-	-	-	1520
	THSW	450	480	-	480	-	-	-	-	-	2640
	PI	-	110	-	-	-	-	-	-	-	-
	JP	-	700	-	1000	-	-	-	-	-	-
	CE	-	-	-	-	-	-	-	-	-	-
	BS	-	1170	-	4150	-	-	-	-	-	-
	SP	630	1670	-	3920	-	-	-	-	-	4840
	BF	1340	2210	-	8630	-	-	-	-	-	12700
2	THP	5460	930	330	820	-	-	-	-	-	440
	THSW	6460	1970	530	980	-	-	-	-	-	1110
	PI	890	-	-	50	-	-	-	-	-	-
	JP	-	110	-	-	-	-	-	-	-	-
	CE	210	760	390	750	-	-	-	-	-	-
	BS	-	1130	1330	-	-	-	-	-	-	-
	SP	6650	4100	2680	5110	-	-	-	-	-	1690
	BF	15170	4350	760	1900	-	-	-	-	-	1160
3	THP	60	-	-	-	-	700	2370	-	3440	3330
	THSW	50	-	-	-	-	560	1370	-	1680	3220
	PI	-	-	-	-	-	-	-	-	-	-
	JP	-	-	-	-	-	-	-	-	-	-
	CE	-	-	-	-	-	-	-	-	-	-
	BS	-	-	-	-	-	-	-	-	-	-
	SP	600	-	-	140	-	1710	2930	-	2490	3160
	BF	150	-	-	70	-	310	-	-	770	3200
4	THP	-	-	-	-	-	-	-	-	-	-
	THSW	-	-	-	-	-	120	490	-	-	-
	PI	-	-	-	-	-	-	-	-	-	-
	JP	-	-	-	-	-	-	-	-	-	-
	CE	-	-	-	-	-	180	-	-	-	-
	BS	-	-	-	-	-	-	-	-	-	-
	SP	-	-	-	-	-	770	2910	-	-	-
	BF	-	-	-	-	-	-	-	-	-	-
5	THP	-	-	-	800	-	2870	510	3310	1250	-
	THSW	-	-	-	500	-	3360	1260	4480	1020	-
	PI	-	-	-	-	-	630	190	670	-	-
	JP	-	-	-	-	-	-	-	-	-	-
	CE	-	-	-	220	-	2580	-	2710	530	-
	BS	-	-	-	140	-	590	210	-	-	-
	SP	-	-	-	840	-	8660	3800	9520	1820	-
	BF	-	-	-	240	-	-	-	-	550	-
6	THP	-	-	-	120	-	810	330	-	-	-
	THSW	-	590	2520	960	1080	4620	3130	-	-	-
	PI	-	60	720	180	150	2670	390	-	-	-
	JP	-	390	2460	-	350	2700	1130	-	-	-
	CE	-	240	1090	210	440	290	-	-	-	-
	BS	-	4070	8980	4770	2580	12110	7650	-	-	-
	SP	-	1600	4840	2430	1340	8190	6900	-	70	-
	BF	-	510	-	70	-	-	-	-	-	-
7	THP	-	-	-	-	-	-	-	-	-	-
	THSW	-	-	-	-	-	420	610	320	-	-
	PI	-	-	-	-	-	120	70	-	-	-
	JP	-	-	-	-	-	100	-	-	-	-
	CE	-	-	-	-	-	-	-	80	-	-
	BS	-	-	-	-	-	650	950	130	-	-
	SP	-	-	-	-	-	740	870	300	-	-
	BF	-	-	-	-	-	-	-	-	-	-

Table 3. Objective levels for finer-resolution Vegetation Communities.

License	Ecoregion	Nested Species[1]	Vegetation Community to Nest In[2]	Nested Species Compositional Criteria[3]	Objective Area (ha)[4]
1	1	RS	SP	RS>=35%	140
1	2	RP	PINE	RP>=35%	90
1	2	RS	SP	RS>=35%	920
2	2	RS	SP	RS>=35%	1080
2	2	TL	RS	TL>=10%	230
3	2	RS	SP	RS>=35%	170
3	6	HE	SP	HE>=10%	100
3	6	HE	THSW	HE>=10%	250
3	6	RP	PINE	RP>=10%	70
3	6	RS	SP	RS>=35%	470
3	6	TL	RS	TL>=35%	120
3	6	TL	CE	TL>=10%	50
3	6	TL	SP	TL>=10%	50
4	2	RS	SP	RS>=35%	820
4	2	TL	CE	TL>=10%	50
4	3	RS	SP	RS>=35%	90
4	5	HE	SP	HE>=10%	120
4	5	HE	THP	HE>=10%	60
4	5	HE	THSW	HE>=10%	70
4	5	RS	SP	RS>=35%	710
4	6	HE	SP	HE>=10%	300
4	6	HE	THSW	HE>=10%	180
4	6	RS	SP	RS>=35%	980
4	6	TL	RS	TL>=10%	190
5	6	RS	SP	RS>=35%	90
5	6	TL	RS	TL>=10%	250
6	3	RS	SP	RS>=35%	1260
6	5	HE	CE	HE>=10%	50
6	5	HE	SP	HE>=10%	260
6	5	HE	THSW	HE>=10%	90
6	5	RP	PINE	RP>=35%	240
6	5	RS	SP	RS>=35%	1990
6	5	TL	RS	TL>=10%	80
6	5	TL	CE	TL>=10%	170
6	5	TL	SP	TL>=10%	120
6	6	HE	SP	HE>=10%	360
6	6	HE	THSW	HE>=10%	460
6	6	RP	PINE	RP>=35%	70
6	6	RS	SP	RS>=35%	4110
6	6	TL	RS	TL>=35%	80
6	7	RS	SP	RS>=35%	240
6	7	TL	RS	TL>=10%	130
6	7	TL	SP	TL>=10%	80
7	3	RS	SP	RS>=35%	910
7	4	RS	SP	RS>=35%	350
7	5	RP	PINE	RP>=10%	60
7	5	RS	SP	RS>=35%	500
7	5	TL	SP	TL>=10%	190
7	6	HE	SP	HE>=10%	90
7	6	HE	THSW	HE>=10%	260
7	6	RS	SP	RS>=35%	2820
7	6	TL	RS	TL>=35%	110
7	7	RS	SP	RS>=35%	100
7	7	TL	RS	TL>=10%	170
7	7	TL	SP	TL>=10%	60
8	5	HE	SP	HE>=10%	1220
8	5	HE	THP	HE>=10%	130
8	5	HE	THSW	HE>=10%	550
8	5	RP	PINE	RP>=35%	180
8	5	RS	SP	RS>=35%	3340
8	5	TL	SP	TL>=10%	220
9	3	RS	SP	RS>=35%	1710
9	5	HE	SP	HE>=10%	100
9	5	RS	SP	RS>=35%	890
9	5	TL	CE	TL>=10%	80
9	5	TL	SP	TL>=10%	90
10	1	RS	SP	RS>=35%	1730
10	2	RS	SP	RS>=35%	430
10	3	RS	SP	RS>=35%	410

[1] RS - Red Spruce; RP - Red Pine; TL - Eastern Larch; HE - Eastern Hemlock. [2] See Table 1 for Vegetation Community Definition. [3] % of photo-interpreted tree species composition. [4] Nested within objective levels reported in Table 2.

In addition, for 2007-12 management planning:
(i) Vegetation communities will be defined using photo interpreted stand attributes as found in the forest inventory. Only stands with a crown closure ≥ 50% (code of 3 and 63 or greater) and with a development stage of mature or overmature will be eligible candidates for meeting vegetation community objectives.

(ii) There will be a requirement to spatially identify vegetation communities in the 2007 management plan to ensure patch size requirements are met and that area contributing to vegetation communities, on all landbases, is harvested accordingly. Vegetation community patches below 5 hectares will not contribute to objective levels except in cases where a vegetation community objective cannot be met in patches greater than 5 ha.

(iii) Harvesting in vegetation communities will be permitted with a maximum of 30% volume removal every 30 years across species and diameter classes in order to maintain a post-harvest age class structure / species assemblage in a similar proportion as the pre-harvest condition. Patch, strip and low-basal area shelterwood harvests will not qualify since maintenance of continuous canopy cover is also a consideration of harvesting in vegetation communities.

(iv) In cases where the area in mature/overmature stands with high crown closure (≥ 50%) for a vegetation community is currently below the objective level, less desirable stands will be allowed to count towards the objective in the following order of recruitment:

a) Mature development stage, crown closure ≥ 50%, Patch ≥ 2ha
b) Immature development stage, crown closure ≥ 50%, Patch ≥ 5ha
c) Immature development stage, crown closure ≥ 50%, Patch ≥ 2ha
d) Mature development stage, crown closure < 50%, Patch ≥ 5ha
e) Mature development stage, crown closure < 50%, Patch ≥ 2ha
f) Immature development stage, crown closure < 50%, Patch ≥ 5ha
g) Immature development stage, crown closure < 50%, Patch ≥ 2ha

However, where a vegetation community cannot be met using the above stands, Licensees will be required to recruit stands classed in the Young development stage to satisfy the objective level.

2.3 Fine-Filter Strategy

Forest ecosystems will be further protected using a fine-filter approach to preserve sites of high or unique ecological value. In 2001, government approved, in principle, 5,000 hectares of new fine-filter protected natural area for Crown land. Recently, these areas have been identified and will be accommodated in the 2007-12 forest management plans on each of the Licenses where they occur.

3.0 Fish and Wildlife Habitat

This Section details the objectives, planning requirements, habitat descriptions and management guidelines related to buffer zones, old habitats and deer winter habitat.

Buffer zones are maintained adjacent to all watercourses and wetlands on Crown land as a measure to protect and manage a range of aquatic values, including fish habitat. Associated forest management planning requirements and guidelines are provided in Section 3.3 (Watercourses and Wetlands).

One hundred forty-eight forest-dwelling vertebrate wildlife species (birds, mammals, reptiles and amphibians) were characterized with respect to habitat associations that occur at the scale of overstorey composition and successional stage. Eighteen upland habitat types (combinations of nine overstorey structures and between one and three successional stages) were described as a result. The 2007 forest management plan will address objectives for six old-forest habitats and two deer winter habitats. These include:

- old hardwood habitat (OHWH)
- old tolerant hardwood habitat (OTHH)
- old pine habitat (OPIH)
- old mixedwood habitat (OMWH)
- old spruce-fir habitat (OSFH)
- old forest habitat (OFH)
- Severe Winter Deer Habitat (SWDH)
- Moderate Winter Deer Habitat (MWDH)

Objectives, planning requirements, habitat descriptions and planning guidelines for these habitats are described in the following sections: Old-Forest Wildlife Habitats, and Deer Winter Habitats.

3.1 Old-Forest Wildlife Habitats

3.1.1 Habitat Objectives

Objectives for the six old-forest wildlife habitats (OHWH, OTHH, OPIH, OMWH, OSFH and OFH) were calculated based on maintaining viable populations of associated species across the areas of Crown land to which they are indigenous. Objectives were compiled for each ecoregion, and prorated to Crown Licenses (Table 4). Licenses shall be required to managed and maintain these habitats at or above the objective levels.

In the event habitat levels cannot be maintained at the ecoregion level, Licensees should maintain habitat elsewhere on the License until it is possible to meet the objective in the appropriate ecoregion. If a habitat objective cannot be met within 35 years, a strategy for meeting the objective over the longer term will be proposed. If it is not possible to maintain habitat at the License level, DNR may direct another License to maintain the shortfall until such time it becomes available on the original License.

Provision of OSFH and OFH objectives beyond the spatial planning horizon requires that the area of *gross habitat* (the total hectares of forest meeting stand-level criteria without regard for patch-size criteria) exceed that of the spatially-referenced objective (*net habitat*). To that end, the Licensee will determine an objective for *Gross OSFH* and *Gross OFH* for Periods 8 to 16 calculated for each as follows:

Gross Habitat Objective = Habitat Objective x GNR,

where *Habitat* is either OSFH or OFH, and *GNR* = Gross:Net Ratio.
GNR is calculated as:

GNR = Min Gross Habitat ÷ Net Habitat,

Table 4. Old-forest wildlife habitats by ecoregion and License

Ecoregion	Habitat Type	Objective by Crown License (ha)									
		1	2	3	4	5	6	7	8	9	10
1	OHWH	276	313	-	302	-	-	-	-	-	1961
	OTHH	1150	728	-	480	-	-	-	-	-	4786
	OSFH	1235	3134	-	7485	-	375	-	-	-	8924
	OMWH	1688	2853	-	5277	-	-	-	-	-	10661
	OFH	1692	3702	-	8403	-	375	-	-	-	11633
2	OHWH	3513	1074	237	389	-	-	-	-	-	489
	OTHH	8729	2509	502	1134	-	-	-	-	-	1413
	OSFH	15887	5143	2676	4335	-	-	-	-	-	1883
	OMWH	14413	4666	1280	2257	-	-	-	-	-	1276
	OFH	22690	6989	3187	5198	-	-	-	-	-	2962
3	OHWH	169	-	-	-	-	367	1021	58	1646	2442
	OTHH	223	-	-	-	-	964	3228	182	5284	6790
	OSFH	427	-	-	375	-	1177	2362	375	2473	4194
	OMWH	463	-	-	-	-	899	2294	146	2296	4142
	OFH	670	-	-	375	-	1711	4029	375	5030	8118
4	OHWH	-	-	-	-	-	146	329	-	-	-
	OTHH	-	-	-	-	-	210	981	-	-	-
	OSFH	-	-	-	-	-	553	1671	-	-	-
	OMWH	-	-	-	-	-	509	1197	-	-	-
	OFH	-	-	-	-	-	375	910	-	-	-
5	OHWH	-	-	141	377	-	1857	676	2877	668	57
	OTHH	-	-	466	1311	-	4539	959	7155	2156	83
	OSFH	-	-	375	1054	-	8272	2661	8744	1884	375
	OPIH	-	-	-		-	521	-	1149	-	-
	OMWH	-	-	392	1097	-	5986	1827	9173	1641	362
	OFH	-	-	375	1050	-	7612	2688	8484	1898	375
6	OHWH	-	488	1402	509	469	1439	1395	-	-	-
	OTHH	-	1013	2958	1634	821	3811	1669	-	-	-
	OSFH	-	2639	10009	4230	2714	15757	9481	-	-	-
	OPIH	-	-	-	-	-	2773	96	-	-	-
	OMWH	-	1679	4664	1687	2112	5822	4514	-	-	-
	OFH	-	3045	11272	4658	3003	16823	10705	-	-	-
7	OHWH	-	-	-	-	-	347	488	116	-	-
	OTHH	-	-	-	-	-	372	425	394	-	-
	OSFH	-	-	-	-	-	1144	1337	375	-	-
	OPIH	-	-	-	-	-	116	65	-	-	-
	OMWH	-	-	-	-	-	664	779	263	-	-
	OFH	-	-	-	-	-	1493	1806	468	-	-

Where:
Min Gross Habitat is the minimum gross habitat level during the first 35 years generated by a model run that maximizes timber supply from all landbases, and
Net Habitat is the amount of forest meeting both stand-level and spatial criteria for the same period from which Min Gross Habitat was determined.

3.1.2 Planning Requirements

Requirements for OHWH, OTHH, OPIH and OMWH

The objective levels, and the supply of gross OHWH, OTHH, OPIH and OMWH from all landbases under: 1) a no-intervention, and 2) the proposed management scenario; shall be reported in a table in the management plan by License and ecoregion for the 80-year planning horizon.

For habitats whose projected levels fall within 130% or 200 hectares of the objective within the first 3 periods (15 years), the Licensee and DNR shall have in place by April 1, 2007, an operationally feasible strategy that ensures stands meeting habitat criteria on the ground, are not harvested during Period 1 in a manner that compromises their habitat value.

Requirements for OSFH and OFH

OSFH and OFH have large patch sizes (≥ 375 ha) and to ensure their integrity the objective levels must be identified spatially for the first 35 years of the plan. The spatial identification of OSFH and OFH was completed by Licensees and accepted by DNR in 2004. Barring significant events (e.g., extensive natural disturbance), these areas will be formally approved along with the rest of the management plan in 2007.

The plan shall provide the following information for OSFH and OFH:

(i) License level Information

- The net and gross objective levels
- The total projected non-spatial supply of OSFH and OFH from all Landbases under: 1) a no-intervention and 2) the proposed management scenario. Supplies will be reported in a table by Ecoregion for the entire 80-year planning horizon.

- The proposed harvest volumes by period.

(ii) OSFH & OFH Block level Information

- Individual block summaries of OSFH / OFH supply for Periods 1 to 7 and expected harvest levels (Period 1 only) as per the format in Appendix 2

3.1.3 Habitat Descriptions

Each habitat (OHWH, OTHH, OPIH, OMWH, OSFH and OFH) is described in terms of its stand and forest attributes in the document *Habitat Definitions for Old-Forest Vertebrate Wildlife* (DNR, 2005).

For the purpose of forest management planning, DNR Habitat Program assigned habitat windows to each FDS plot based on the structure definitions and projected stand development. The individual FDS plot windows will be the basis for assigning habitat windows to forest strata (groups of FDS) for management planning. Forest strata will receive habitat windows based on the percentage of the plots in a stratum that meet habitat structure definitions.

3.1.4 Management Guidelines

Habitat Considerations in Forest Characterization

A goal of forest characterization is to accurately represent the abundance of the six habitats on Crown land and to make possible projections of their abundance through time and in response to harvest treatments.

DNR Habitat Program will estimate time-zero habitat abundance for each License based on habitat status of associated FDS plots. Time-zero levels will serve to identify habitats near or below target levels, and allow the accuracy and biases of forest characterization to be quantified. To the extent possible, habitats that are in short supply should be in unique strata to afford a high degree of management control. Additional guidelines are given in the *Planners Guide to 2007 Forest Management Planning* (DNR, 2004).

Timber Harvesting Guidelines

To reflect the standards for OSFH and OFH management in the DNR Forest Management Manual, the following guidelines should be considered when modeling timber harvest in OSFH and OFH blocks.

Habitat to Habitat Harvest Treatments

The following guidelines should be followed when the intent is to maintain a habitat condition after a partial-harvest treatment.

- Forest strata dominated by mature balsam fir, or by a combination of over-mature balsam fir and spruce, are not eligible for partial harvest.
- Strata with low crown closures (< 4) are not eligible for partial harvest.
- Harvesting can remove no more than 30% of the merchantable volume.

3.2 Deer Winter Habitat

The 2007 forest management plan shall provide a strategic overview of deer winter habitat supplies, forest management activities, timber supply, and required silviculture levels on the deer wintering area (DWA) landbase. Two habitat types are tracked in the forest management plan:

- Moderate Winter Deer Habitat (MWDH)
- Severe Winter Deer Habitat (SWDH)

3.2.1 DWA Management Objectives

The management objective in DWA is to maximize the sustainable supplies of MWDH and SWDH, with priority given to SWDH in the northern zone of the province and to MWDH in the southern zone (Figure 2). Abundance of the priority habitat cannot be reduced by more than 15% in any one 5-year Period. The modeling process to achieve this is presented under *3.2.4 Management Guidelines.*

Figure 2. Management zones for deer winter habitat.

3.2.2 Planning Requirements

Management of deer winter habitat is planned and implemented on DWA landbase defined for each License (Table 5).

Table 5. 2007 deer wintering area landbase by License

License	DWA Area (hectares)	License	DWA Area (hectares)
1	56,540	6	47,750
2	21,510	7	27,590
3	10,350	8	29,950
4	19,830	9	17,680
5	2,810	10	46,110
		Total	280,120

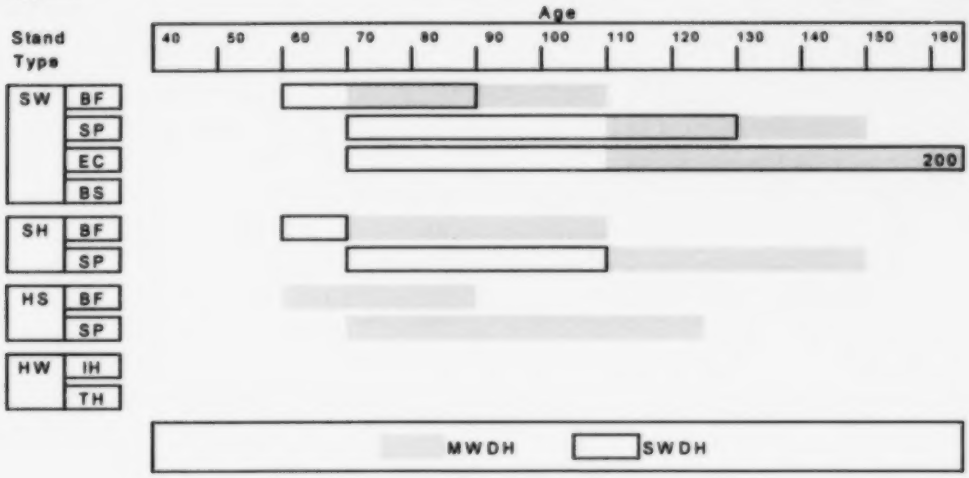
The DWA landbase is divided into 4 categories: northern DWA with and without approved management plans, and southern DWA with and without approved plans. Reporting requires that modeling of the DWA landbase be undertaken separately for each category. Information to be reported includes:

1. List of DWA (DWA# and area) with management plans approved between 1992 and 2007.
2. List of DWA for which follow-up management plans are required between 2007-2012.
3. Identification of DWA, and their areas, for which first-time management plans will be developed between 2007 and 2012.
4. For each category of DWA, the following is required:
    1. The 80-year MWDH and SWDH supplies from a no-intervention scenario and from the management plan scenario.
    2. The 80-year wood supply, with data compiled from approved individual-DWA management plans, if they exist, or from the management plan scenario.
    3. Harvest area by treatment type for Period 1.
    4. Planting and spacing areas for Periods 1 through 16. For DWA categories without approved individual plans, a quantitative description of the benefits to habitat supply of proposed silviculture levels is also required.
5. DWA must be indicated on management-plan map products.

3.2.3 Deer Winter Habitat Descriptions

Structural defnitions of DWA are described in *Habitat Definitions for Old-Forest Vertebrate Wildlife* (DNR 2005). Definitions used for management planning are estimates of the times during which suitable forest types supply habitat (Table 6). Suitability of similar stand types may vary, depending on the abundance of other tree species. Stands that are not expected to achieve a peak softwood volume of 80 m^3/ha (60 m^3/ha if cedar-dominated) do not contribute to SWDH; those that are not expected to achieve 50 m^3/ha of softwood do not contribute to MDWH. The DNR Habitat Program will assign DWA suitability windows to License timber yield curves.

Table 6. Deer winter habitat suitability by stand age for example stand types.



3.2.4 Management Guidelines

Timber Harvesting Guidelines

To reflect the standards for DWA management in the Forest Management Manual, the following guidelines should be considered when planning timber harvest in DWA.

- To minimize planting softwood, harvest treatments that promote natural conifer regeneration shall be investigated and given priority where opportunities exist.
- Harvesting of cedar and hemlock trees should only occur when it is a necessary component of a harvest prescription to regenerate these species.
- Tolerant hardwood stands that meet the eligibility criteria defined in *Best Management Practices for Tolerant Hardwood* (DNR, 1996) shall be managed according to those standards. In other hardwood stands, management should favour increasing the softwood component of the stand.

- In order to promote long-term browse production, treatment of hardwood stands should be scheduled throughout the management plan time horizon (i.e., avoid treating all candidates in one period).

Habitat-to-Habitat Harvest Treatments

The following guidelines should be followed when the intent is to maintain a habitat condition after a partial-harvest treatment.

- Forest strata dominated by mature balsam fir or by a combination of over-mature balsam fir and spruce are not eligible for partial harvest.
- Strata with low crown closures (< 4 for SWDH and < 3 for MWDH) are not eligible for partial harvest.
- Harvesting can remove no more than 30% of the merchantable volume.

Modelling Guidelines

The modelling sequence outlined below will maximize the supply of primary habitat and maintain secondary habitat at the highest level possible. Steps include:

1. Maximize primary habitat, subject to not reducing habitat abundance by more than 15% in any single 5-year period.
2. Set primary habitat flow as a constraint, and maximize secondary habitat.
3. Explore the benefits of silviculture (planting, spacing) on supplies of both primary and secondary habitats.

3.3 Watercourses and Wetlands

All mapped watercourses and wetlands have been buffered for forest management planning as per the average widths by License and water feature shown in Table 7. Operationally, buffer zones and no-tracking zones will be applied and managed as outlined in the Forest Management Manual for Crown Lands.

Timber harvesting in buffer zones shall be modelled to respect the following guidelines that reflect the standards in the Forest Management Manual:

- Forest strata dominated by mature balsam fir, and/or over-mature balsam fir and spruce, cannot be modelled for harvest.
- Only high crown closure strata (i.e., cc ≥ 4 or 64) are eligible for harvest.
- Harvesting can remove a maximum of 30% of the merchantable volume.

Table 7. Buffer Widths by Crown Timber License and Feature.

License	Buffer Width (meters) by Feature				
	Wetlands	Single Line[1] Stream	Double Line[2] Stream	Rivers	Lakes
1	30	33	66	150	100
2	30	30	60	150	100
3	30	33	89	128	100
4 a[3]	30	55	117	139	150
4 b[4]	30	100	150	150	150
5	30	37	76	100	100
6	30	35	85	110	100
7	30	35	85	110	100
8	30	40	61	107	100
9	30	35	60	112	100
10	30	37	80	100	100

[1] **Single Line** - Single line water features on GIS cover type maps (streams). Also applies to lakes / ponds 4ha.

[2] **Double Line** - Double line water features on GIS cover type maps (small rivers).

[3] Area of License not in Big South or Nepisiguit area.

[4] **Big South and Nepisiguit area.**

4.0 TIMBER

4.1 Wood Supply

At the License level, hardwood harvest levels will be maximized after the sustainable Spruce, Fir, Jack Pine AAC has been established. The Provincial Spruce, Fir, Jack Pine AAC will be maintained at the level established in 2002.

4.2 Scheduling

Stands will be scheduled for harvest so as to minimize volume loss due to mortality.

4.3 Tolerant Hardwood Management

In accordance with the New Brunswick Tolerant Hardwood policy, uneven-aged management techniques will be employed in quality tolerant hardwood stands that have potential for sawlog production.

4.4 Red Spruce, White Pine and Cedar Management

Non-clearcut harvest prescriptions will be required in quality Red Spruce, White Pine and Cedar stands to maintain and enhance the stand quality and to promote natural regeneration of those species.

4.5 Red Pine Management

To maintain the current area of red pine and its species associations, a multiple-entry harvesting regime will be required in suitable red pine stands to retain red pine and promote quality product development. All harvested areas with greater than 40% of red pine (pre-harvest) will be regenerated to red pine.

4.6 Harvest Prescriptions

A full range of harvest prescriptions (e.g., selection, multi-pass, clearcut) will be investigated. Those that are biologically and economically suited to existing stand structures and are compatible with achieving the stated forest objectives will be implemented. Wherever possible, clearcut harvesting will be reserved only for those stands not suitable for other harvest prescriptions.

4.7 Harvest Blocking

Hardwood and softwood clearcut harvest blocks will not exceed 100 ha in size. The timing of harvest in adjacent blocks must not be less than 2 periods (period = 5 years) when the combined area of adjacent blocks exceeds 100 ha. Larger harvest blocks are possible if their purpose is to salvage mortality resulting from blowdown, fire, disease, etc.

For the purpose of maintaining the 2002 AAC, modification of these basic blocking rules may be required as follows:

- Clearcut harvest blocks in stand-replacing ecodistricts will range between 80 to 125 ha in size. The timing of harvest in adjacent blocks must not be less then 5 years when the combined area of adjacent blocks exceeds 125 ha.
- The aim is to generate patch sizes of 375 - 500 ha over 20 years. To approximate this patchiness, 80-125 ha blocks should be harvested over a period of 20 year.

4.8 Silviculture

Silvicultural treatments of planting and spacing in hardwood and softwood will be implemented to support maximum increases in both present and future sustainable wood supplies and the provision of other non-timber objectives. The 5-year funding level for the silviculture program established in the 2007 management plans will be set by government prior to the end of 2005.

5.0 RECREATION & AESTHETICS

5.1 Aesthetic Buffers

Aesthetic buffer zones 30 metres wide will be maintained along all provincial highways that abut Crown forest land. Aesthetic buffer zones 60 metres and wider may be applied along watercourses with high recreational use.

5.2 Recreation

The integrity of existing recreational sites will be maintained.

6.0 MANAGEMENT PLAN FORMAT

The 2007 management plan will include all of the information described in the Table of Contents found in Appendix 1. This also establishes the minimum standards required to meet Licensee Performance Evaluation for forest management preparation.

APPENDIX 1:

TABLE OF CONTENTS FOR 2007 MANAGEMENT PLANS

A VISION FOR NEW BRUNSWICK FORESTS
Appendix 1
2007 Management Plan Format

Letter of Submission From Licensee .....
Indicate that the plan has been prepared by a Registered Professional Forester and has been designed to meet Crown land objectives.

Letter of Plan Acceptance From Regional Director ..... **(i)**
Shows up front that the plan has been submitted and approved by the DNR.

Executive Summary..... **(ii)**
Summarize all relevant information supplied in the plan, including AAC by species group and habitat levels.

1.0 Background .....

1.1 Requirements of the Crown Lands and Forests Act.....
Set the stage to put the rest of the plan in context. Describe requirements under the Act, describe the link to the Operating Plan. Describe the DNR role in approval and link to the evaluation process.

1.2 Summary of the 2002 Management Plan .....
Put this plan in further context by describing timber and habitat levels from the 2002 management plan. Discuss any forest management issues that were revealed in the 2002 plan.

1.3 Management Planning Objectives for 2007.....
Summarize the objectives for the 2007 plan. Include the "public" objectives document.

1.4 Management Planning Procedures .....
Introduce modelling procedures, data used, etc. Note improvements since 2002.

2.0 Present Land Base Description.....

2.1 Forest Inventory.....
Describe the inventory used, its source and data to support it.

2.2 Area Description.....
Describe the total Licence area in terms of primary management objective. Include non-productive forest. Describe landbase categories e.g., Vegetation Communities, OSFH, OFH, DWA, Buffers, Sugar Bushes, Ecological Reserves, inoperable. Show numbers of and size of each where applicable.

2.3 Forest Stratification.....
Describe the stratification process - what data used and how decisions made to create strata. Describe strata created and the area of each.

2.4 Yield Curves.....
Describe how yield curves were created and the data used to support them. Reference the complete set of yield curves in the Appendix.

2.5 Description of Harvest and Silviculture Treatments.....
Provide a list of all harvest prescriptions used in the plan and a description of each including, for example, percent removal modeled where applicable, and expected regeneration response.

2.6 Post Treatment Regeneration Response.....
Describe transition matrix and data and rationale to support it. Describe its importance in the modelling exercise.

3.0 General Forest.....
Introduce the general forest components and the reasons for describing the forest this way.

3.1 Spruce, Fir and Jack Pine.....

3.1.1 Objectives.....

Describe the objectives for this part of the forest i.e., to determine the non-declining harvest level over 80 years, harvesting "oldest first", factoring in silviculture to the maximum allowable cut effect.

3.1.2 Silviculture Levels.....

Show impact of silviculture compared to no silviculture. Show what factors were used to zero in on the chosen levels.

3.1.3 Harvest Prescriptions.....

Describe harvest prescriptions chosen and why. Describe the periods each will be implemented. This should link back to 2.6 above.

3.1.4 Blocking Strategy.....

Describe block size and adjacency rules. Describe how blocking was done. Describe average block size. Describe degree of compliance with block size and adjacency rules. Map the first 25-35 years of harvest blocks (i.e., through the low point in growing stock).

3.1.5 Sustainable Harvest Level.....

Describe sustainable harvest level from this landbase. Show all fallout volumes.

3.1.6 Growing Stock.....

Describe and graph the growing stock for this landbase

3.2 Hardwood.....

3.2.1 Objectives.....

Describe objectives for this part of the forest i.e., maximize sustainable harvest, select harvest in tolerant hardwood with sawlog potential.

3.2.2 Silviculture Levels .....

Describe chosen silviculture levels and why.

3.2.3 Harvest Prescriptions .....

Describe harvest prescriptions chosen and why. Describe the periods each will be implemented. This should link back to 2.6 above.

3.2.4 Blocking Strategy .....

Describe block size and adjacency rules. Describe how blocking was done. Describe average block size. Describe degree of compliance with block size and adjacency rules. Map the first 25-35 years of harvest blocks (i.e., through the low point in growing stock).

3.2.5 Sustainable Harvest Level .....

Describe sustainable harvest level from this landbase. Show all fallout volumes.

3.2.6 Growing Stock

Describe and graph the growing stock for this landbase

3.3 Cedar and White Pine .....

3.3.1 Objectives .....

Describe objectives for this part of the forest.

3.3.2 Silviculture Levels .....

Describe chosen silviculture levels if any.

3.3.3 Harvest Prescriptions .....

Describe harvest prescriptions chosen and why. Describe the periods each will implemented. This should link back to 2.6 above.

3.3.4 Blocking Strategy.....

Describe as necessary.

3.3.5 Sustainable Harvest Level.....

Describe sustainable harvest level from this landbase. Show fallout volumes, if present.

3.3.6 Growing Stock.....

Describe and graph the growing stock for this landbase

4.0 Wildlife Habitat.....

Provide a general introduction of the wildlife habitats being managed for on the License and the habitat types being tracked

4.1 Old Forest and Old Spruce-fir Habitat.....

4.1.1 Old Forest Habitat (OFH) and Old Spruce-fir Habitat (OSFH) Objectives.....

Describe what OFH and OSFH are (stand level and block level requirements) and the Net and Gross objectives by ecoregion. Reference other documents where necessary.

4.1.2 Net OSFH Supply.....

Provide a table summarizing habitat and timber supplies from OSFH and OFH blocks. Habitat summary should include, for each period, net OSFH and/orOFH supply by block, by ecoregion and for all blocks combined. Timber summary should include, for each period, wood supply for blocks combined and area by treatment type. For wood supply allocation purposes, the Licensee should estimate spatial wood supply for Period 1 and describe how it was estimated.

For each OSFH and OFH Block, describe in Appendix IV the habitat supply and planned timber harvesting by period and Ecoregion(s) (see example in Figure 1). Information is to include:

- *OSFH and/or OFH Block ID*
- *Ecoregion(s) #*
- *Periods the Block contributes to the Net OSFH and/or OFH objective.*
- *Total area (ha) (forest + non-forest) and DWA overlap (ha)*
- *Projected non-spatial timber harvest level (volume & hectares) by period, indicating treatment type and, for Period 1, pre/post treatment OSFH and/or OFH response as per FMM Appendix 11 requirements.*
- *Habitat supply (ha) by ecoregion for each period for the proposed management scenario and for a no-harvest scenario.*
- *Percent of Block in habitat condition by period for the proposed management scenario and for a no-harvest scenario.*

Provide the computer files necessary to project habitat and timber harvesting.

Provide a OSFH/OFH Block stand file listing: Block ID; DWA #; map number; stand number; stand area in the Block; curve ID; stand age and periods the stand contributes to the OSFH Block.

OSFH and OFH blocks must be features on License harvest block maps. OSFH and OFH Blocks must be referenced with a nine character code (e.g. OSF453802, where: OSF = OSFH Block; 4538 = principle FDS map#; 02 = second OSFH Block on map 4538). The management periods that the OSFH/OFH Block is contributing to the Net OSFH/OFH objective should be indicated on the maps. In the case of OSFH/OFH Blocks that have multiple sections, the sections should be identified on the map with periods of suitability indicated.

4.1.3 Gross OSFH and OFH.....

Describe the calculation of the Gross OSFH and OFH objectives.

Show the 80 year supply of Gross OSFH and OFH along with the License Gross OSFH and OFH objective under the proposed forest management strategy (graphed). The source landbases (General forest, DWA, OSFH/OFH Block, Buffer, etc.) should be identified separately.

4.2 Deer Wintering Area Management

4.2.1 DWA Habitat Management Objectives

Describe the DWA landbase on the License (# of DWA, total area, DWA management region, deer activity), the winter habitats being managed (moderate winter deer habitat (MWDH) and severe winter deer habitat (SWDH)) and the habitat management objectives.

4.2.2 Summary of Past DWA Management

Summarize in a table DWA management from 1992 to 2007 (# of DWA and total area). Identify the DWAs and total DWA area that require follow-up management plans during 2007 to 2012 (performance criteria).

4.2.3 DWA Management 2007 to 2012

Identify in a table the total hectares of DWA for which 1st-time DWA Management Plans will be developed and implemented during 2007 to 2012 (performance criteria).

<u>Management Scenarios:</u> For each scenario listed below, describe in tables and figures for the entire DWA landbase: MWDH and SWDH supply, percent of DWA landbase in MWDH and SWDH, non-spatial wood supply, harvest levels (hectares) by broad harvest type, planting and spacing levels. Additional scenarios can be included.

i) A no-intervention scenario.

ii) Proposed management scenario for the DWA landbase as a whole; include reasons why this scenario has been proposed over other scenarios

explored from a SWDH, MWDH and wood supply perspective.

For wood supply allocation purposes, estimate spatial wood supply for Period 1, describe how the estimate was determined, and estimate silviculture requirements for Period 1. Computer files for modelling should be provided. OSFH area located in DWAs should be uniquely identified. DWAs should be a feature on License harvest blocking maps.

4.3 Other Wildlife Habitat Types.....

Describe the wildlife habitat types being tracked on the License (OHWH, OTHH, OMWH, and, if applicable, OPIH). Show the supply of each in a table and discuss the identified thresholds and supply of each by ecoregion under the proposed forest management strategy. Identify any periods where the supply of a habitat type falls below the threshold and what actions will be undertaken to address it, as approved by DNR.

5.0 Water.....

5.1 Watercourse Buffer Zones.....

In general terms describe the function of watercourse buffer zones in relation to water quality and aquatic habitat.

Identify in a table the average buffer zone widths by watercourse feature applied for management planning on the License. Identify the total area in watercourse buffer zones.

Identify whether timber harvest treatments will occur in watercourse buffer zones and, if so, explain the procedure used to quantify wood supply in this zone, identify the harvest treatments involved, the aspatial wood supply by period, the estimated spatial wood supply and hectares to be treated during 2007 to 2012.

6.0 Recreation & Aesthetics

Describe the recreational resources on the License

6.1 Highway Aesthetic Buffer Zones

In general terms describe the function of aesthetic buffer zones.

Identify the width of buffer zones along provincial highways (30 metres) and the total area in these buffers.

Identify whether timber harvest treatments will occur in highway buffer zones and, if so, explain the procedure used to quantify wood supply in this zone, identify the harvest treatments involved, the aspatial wood supply by period, the estimated spatial wood supply and hectares to be treated during 2007 to 2012.

7.0 Unique Sites

Describe the unique sites on the License.

8.0 Long Term Forest Indicators

8.1 Vegetation Communities

Discuss the implementation of the vegetation community objectives. Document reduction in wood supply required to meet objectives. Note any community objective that could not be met and what actions will be undertaken to address it, as approved by DNR.

8.2 Piece Size

Show graph of softwood and hardwood piece size over the 80-year planning horizon and discuss features, issues, etc.

8.3 ***Harvest Prescriptions***.....
Show graph of softwood and hardwood volume by the various harvest prescriptions proposed in the plan. Discuss.

8.4 ***Source of Harvest Volumes***.....
Show graph of softwood and hardwood harvest volume from each of the landbases (OSFH, DWA, etc.)

9.0 ***Summary of Blocked Timber Supply Volumes***.....
Summarize by landbase, all of the volumes derived from above analysis. Estimate blocked volumes for those landbases not actually blocked.

10.0 **Discussion**.....
Discuss main features of the plan and any issues that have arisen.

11.0 **Appendices**.....

Appendix 1: Common Abbreviations and Definitions

Appendix 2: Computer File Description

Appendix 3: Reports for Timber and Habitat Supply Runs (on disk)

Appendix 4: Description of Strata Used in Timber and Habitat Supply Analysis

Appendix 5: Yield Curves used in the Timber and Habitat Supply Analysis

Appendix 6: OSFH Block Summary

Appendix 7: Mapped Harvest Blocks, DWAs and OSFH by Period at 1:125,000

Appendix 8: Mapped Harvest Blocks, DWAs and OSFH by Period at 1:25,000

Appendix 9: Management Plan Highlights
Provide a document, for public distribution, in the similar format as the 2002 Management Plan Highlights.

Appendix 10: Development of Silvicultural Prescriptions

Appendix 11: Description of Treatment Response

Appendix 12: Harvest Block Summaries for all Blocked Periods to Low Point and Stand Listing

Appendix 13: Final Database Used for Planning

APPENDIX 2:

SAMPLE OSFH/OFH BLOCK SUMMARY

Appendix 2
Sample OSFH/OFH Block Summary

OSFH/OFH Block: OFH330101 (OSFH330101 (P1-7) in 2002 FMP)
Ecoregion(s): 2 (100 %)
Contributes to Net OFH: Periods 1 to 7
Contributes to Net OSFH: Periods 1 to 7
Total Block Area: P1-5 = 4000 ha; P6-7 = 3000
DWA Overlap: 1500 ha (38%)(50% of DWA330101 is in the OSFH Block)
Model: Woodstock 1.5
Files: OFH330101.*; Appendix 2, disk 1

Management Period	1	2	3	4	5	6	7
Block Size (ha)	4000	4000	4000	4000	4000	3000	3000
No Intervention Habitat OFH Supply (ha)	3500	3500	3400	3250	3150	2800	2500
% OFH	88 %	88 %	85 %	75 %	79 %	93 %	83%
OFH Supply	3900	3900	3800	3650	3550	3000	2700
% OFH	98 %	98 %	95%	91%	89%	100 %	90 %
Intervention							
DWA Portion						0	0
Clearcut (ha)	200	100	0	150	0		
Selection (ha)	50	50	0	0	50		
Non-DWA Portion							
Clearcut (ha)	100	0	50	100	50	0	0
Selection (ha)	100	0	50	0	0		
Harvest Volume	30,00	10,00	6,000	20,00	6,000	0	0

(m^3)	0	0		0			
Post-Intervention Habitat OFH Supply (ha)	3300	3250	3250	3100	3050	2800	2500
% OFH	83 %	81 %	81 %	78 %	76 %	93 %	83 %
OFH Supply	3700	3650	3650	3500	3400	3000	2700
% OFH	92 %	91 %	91 %	88 %	85 %	100 %	90 %

Period 1 Harvest Summary:
DWA *CC* 200 ha pre/post = habitat to non-habitat (HN)
DWA *SC* 50 ha pre/post = habitat to habitat (HH)
non-DWA *CC* 100 ha pre/post = non-habitat to non-habitat (NN)
non-DWA *SC* 100 ha pre/post = habitat to habitat (HH)

Notes: OFH330101 habitat projections are based on 2007 forest characterization supported by an aerial survey in 2004, precuts for 10% of the block in 1991 and cruise data collected in 1998 for the DWA management plan. The approved DWA harvest was imposed on the OFH block and an additional 100 hectares of selection and 100 hectares of clearcut harvest is proposed for outside the overlap in Period 1. The management plan for DWA330101 will be reviewed and approved in Period 1 before timber harvesting will take place in the OFH block.